

A SMARTER O.R.

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MT. OLYMPUS GOES TECHIE

In the observance of ingenuity there is subtle elegance. A flashlight beam passes over a man's neck, and in the pale blue glow his jugular appears to rise from within muscle and tendon and float across flesh like a whale surfacing for air. Elsewhere, Zeus is summoned to assist mere mortal hands, Hermes delivers more than messages, and invisible knives carve away deadly masses.

At the University of Pittsburgh, technology and surgery commingle; technique and gadgetry intertwine. In trained hands, procedures become more precise, less painful. Lives hang less in the balance, and we dance decisively toward better health.

INNER WORLDS

"You are, in essence, looking into the skin, seeing what's inside," George Stetten says of his sonic flashlight, so named for its pale incandescence. The handheld device sends ultrasound into the body. As the echoes bounce back, a semitransparent mirror reflects an image of blood vessels and tendons within.

Stetten, an assistant professor of bioengineering at Pitt and a research scientist at Carnegie Mellon University, envisions the device, now under patent application, as a guidance system for inserting central lines into deep veins for delivery of chemotherapy agents, for invasive procedures like amniocentesis, and for biopsies of tumors. "It's cheap and safe and portable and small, and it's very fast," he says, pushing the scanner against the top of a water balloon while his hand presses the balloon's underbelly.

"Here's my finger coming in from the other side of the balloon; you can see the joint. I wonder if you can see my ring? Oh. There's my wedding ring. That's cool!"





BATTERIES NOT INCLUDED

Silky music eases from Giselle Hamad's iPod MP3 player like some acoustic anesthesia. The medical director of bariatric and minimally invasive general surgery at Magee-Womens Hospital, Hamad is an avowed tech geek. In this OR, which she helped design, she's home.

At the operating table, Hamad commands Hermes, a voice-activated computer system, to tilt the table 45 degrees. A camera looms above, inside the operating light, and Hamad puts it to work: "Hermes, overhead camera, zoom out." The bird's-eye view of the patient, displayed across the room on a 42-inch digital plasma television screen, pulls back. The screen, one of six monitors here, is part of a video-router link that receives and broadcasts operations to residents and students at Pitt's new Charles G. Watson Surgical Education Center and the world beyond.

Around the table, pneumatic booms descend from the ceiling, hoisting suction and CO_2 machines off the floor, clearing the surgical staff's path. An endoscope guides Hamad through the patient's abdomen, where she performs stomach reduction surgery. A wireless digital headset displays the endoscopic image on a tiny monitor inches from her eyes. Hamad takes a second to pan the room beyond her headset; wide-eyed she says, "This is like Best Buy."









INVISIBLE KNIVES

Inside the gamma knife at UPMC Presbyterian, 201 beams of radiation vanquish a tumor that once prospered behind a man's eye. As he slid into The Oven, as the hulking device is known by some, the man smiled—a reaction common among those about to undergo this procedure. For it is extremely successful. And a marvel of precision: Through holes in a steel helmet bolted to the patient's head, the gamma knife delivers slivers of radiation through skin, skull, and into his brain, forming a three-dimensional confluence of therapy intersecting powerfully at the tumor. It's a little bit like filtering the sun's rays through a magnifying glass to burn a hole in paper.

The device was first used for treatment in the States in 1987—at Pitt. Some 5,000 procedures later, a robotic model positions the head at predetermined coordinates before zapping the offending tissue—another first for the nation and Pitt. "Much of the science behind the use of this technology has come from our institution," says Doug Kondziolka, a professor of neurological surgery and radiation oncology. More people come here for treatment of brain tumors, unstable tangles of blood vessels, and the tremors of movement disorders than anywhere else. The technology is about 90 percent effective in treating most of these conditions, though the rate drops to 35 for aggressive malignancies.

Most patients return home within 24 hours. Most never require treatment again.

ZEUS SUMMONED

Inventors set out in the early 1990s to create an omnicompetent robot that earthbound surgeons would use to perform procedures in space. The concept, however, gave way to a more practical use, heart surgery—on this planet. For Marco Zenati, director of minimally invasive cardiac surgery, the results have been especially rewarding: "It allows me superhuman capacity." Last year, Zeus assisted Zenati during the nation's first robotic coronary bypass on a beating heart.

Zeus, approved for investigational use only, is a command center on wheels. During surgery, Zenati sits at a console directing two robotic arms through joysticks, as if he were the robot's namesake. His brain fires instructions across synapses, his fingers twirl the controls, and electronic impulses hurl across the room through fiber optics. Inside the patient, mechanical wrists twist and thread sutures into a beating heart, moving one-tenth of an inch for every inch Zenati's wrists turn. Zeus eliminates hand tremors that one might experience while performing microsurgery with mere mortal hands.

On Mount Olympus the gods smile. ■

